Centre d'Estudis Demogràfics

POPULATION, HEALTH AND NUTRITION IN SPAIN (18th-20th CENTURIES)

Antonio D. CÁMARA

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Centre d'Estudis Demogràfics

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Centre d'Estudis Demogràfics

2009

Population, Health and Nutrition in Spain (18th-20th centuries)

Antonio D. Cámara
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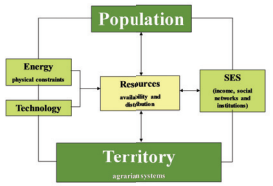
Funding research projects
El futuro de la actividad, la salud y la dependencia en España. Una aproximación generacional desde la Demografía (SEJ2006-002000/GEOG)
Crecimiento, nutrición y bienestar en España. La influencia de los procesos socioeconómicos a largo plazo en los niveles de vida biológicos y la salud (SEJ2007-67613)

Background: **New Spanish economic history claims that modern economic growth in the country can be anticipated at least to the mid 19th century and was particularly intense during its last third. Productive and demographic growth took place since the 18th century and throughout the 19th century but no significant improvements in bio-sanitary indicators occurred until its last decades (e.g. life expectancy remained under 30 years until the 20th century and physical stunting is observed during the central decades of the 19th century)**

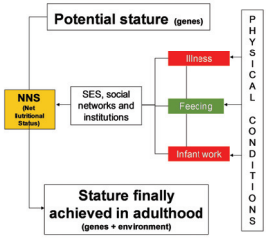
Aims: **Exploring interactions between demographic and socioeconomic variables affecting health over the last two centuries in Spain. Disentangling the effects of environmental, medical and nutritional factors that modeled the health transition in the country**

Approaching to basic needs and nutritional status in the past

Meeting basic needs within an agrarian society



Height as a proxy of nutritional status

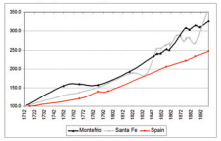


Study cases: two communities in Southern Spain

The *vega* of Granada: Santa Fe

The *vega* (valley) of Granada displayed early signs of transition to the agrarian capitalism since the last third of the 18th century: productive specialization, increasing commercialization and high prevalence of land private ownership. Irrigation was developed since Muslim's times.

Demographic background 1712-1900



Like in the whole of Spain, sustained demographic growth took place since the 18th century. In 1712 population in Montefrio and Santa Fe was of 4,000 and 2,000 respectively. Both of them had doubled by the mid 19th century. Spain raised from 7,5 millions at the beginning of the 18th century to 10,5 in 1787 and 15,5 in 1857.

Mortality crises were usual until the 20th century and displayed a particular graveness during the second half of the 19th century.

The Eastern Mountains of Granada: Montefrio

The county of the Eastern Mountains preserved a mixed agricultural system until the end of the 19th century when olive orchards progressed rapidly. Commons and domestic livestock breeding were much more relevant than in the valley. Dry farming prevailed.

Summary on data and methodology

Communities selected as representative of different agro-ecological scenarios and transitions towards agrarian capitalism during the 19th century

Integration of sources: local censuses, military recruitment books and parish registers

Collection of data at the micro level: name, surname, household, height and date and cause of decease from cohorts born 1750-1950 (over 20,000 cases)

Age-standardized height as a proxy of *net nutritional status*: time-cohort series when specific heights are available / estimates when the register is not exhaustive

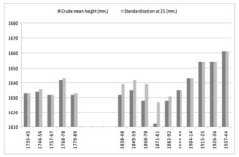
Mortality (rates and patterns) as proxies of general health status

Early evidence on nutritional status in the 18th century

Tracking the minimum height standards required to be enlisted in Spain (regular troops)

	Unit of measure cited in the sources	Conversion (mm.)
1741	*Five feet* (French foot)	1625
1762	*Five feet and one inch*	1656
1770	*Five feet*	1625
1808	*Five feet minus one inch*	1597
1809	*Five feet minus one inch and a half*	1582
1819	*Five feet minus half of an inch*	1609
1821	*Five feet minus one inch*	1597
1836	*four feet, ten inches and six lines*	1582
1837	*Five feet minus one inch*	1597
1856	*Five feet* (Spanish foot)	1506
1859	1569 mm.	1569
1868	1560 mm.	1560
1875 (4th release)	1530 mm.	1530
1877	1540 mm.	1540
1882	1545 mm.	1545
1912	1540 mm.	1540

Male height cycles in Montefrio since the Ancient Regime (cohorts and mm.)



Exploring long-tem trends in height through cohort aggregation

(logistic regression informs on the likelihood to reach 1625 mm.)

	B	S.E.	Wald	df	Sig.	Exp(B)
cohort			161.111	3	,000	
Prior to 1800	Ref.					
1800-49	-,126	,08	2.350	1	,125	,882
1850-1899	-,235	,09	12.485	1	,000	,790
After 1900	-,292	,06	19.993	1	,000	1,339
Age			66.258	2	,000	
19	Ref.					
20	,315	,04	40.857	1	,000	1,370
21	,399	,05	62.617	1	,000	1,490
Community						
Montefrio	Ref.					
Santa Fe	,008	,03	,045	1	,832	1,008
Constant	,098	,07	1.896	1	,168	1,103

a. Variable(s) entered on step 1: cohot, age, community

Sources: Military recruitment Books from Santa Fe and Montefrio (around 20,000 valid cases aged 19+, 1,500 valid cases within the reference cohort-aggregation)

Indirect approaches on long-term trends report on a likely drop of mean height during the first stage of agrarian capitalism with respect to the last stage of Ancent Regime

Biological standards of living during the 19th century: environmental determinants

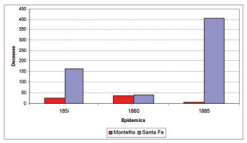
Approaching the epidemiological scenario through mortality patterns

1841-1880

Montefrio			Santa Fe		
Cause	Deaths	%	Cause	Deaths	%
Diarrhea and enteritis	1031	16,65	No specified fevers and infections	1152	23,18
No specified fevers and infections	757	12,25	Infectious transmitted by vectors (malaria)	636	12,80
Respiratory system	720	11,63	Dentistic (Teething)	560	11,27
Respiratory system (infectious)	537	8,68	Circulatory system	317	6,38
Infectious transmitted by vectors	361	5,84	Respiratory system (infectious)	265	5,33
Circulatory system	310	5,02	Respiratory system	258	5,19
			Infectious transmitted by water and foods		
Infectious associated to infancy	294	4,75		248	4,99
Smallpox	279	4,52	Cerebral hemorrhage	228	4,59
Dentistic (Teething)	233	3,77	Measles	218	4,39
Birth or pregnancy	177	2,87	Infectious associated to infancy	126	5,52
Total	4899	79,06		4057	81,66

From adapted Mckeown's classification in Bernabeu et al. (2003): "El análisis histórico de la mortalidad por causas: problemas y soluciones". Revista de Demografía Histórica, XXI, I, pp. 187-193

Cholera outbreaks over the 19th century

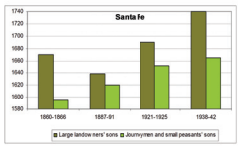


Crude mortality rate and male cohort height (per thousand and millimeters; 5yr moving average)

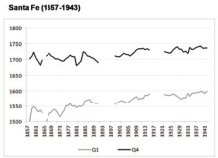
Physical conditions determined local mortality patterns and, indirectly, net nutritional status through the different prevalence of high energy consuming diseases like malaria. This was endemic within the swampy terrains of the Vega and probably was reinforced by the development of massive irrigation during the 19th century. A higher population density and the fact to be a crossroad also eased the spread of epidemics in this area. Altogether, mortality and height display divergent trends in Montefrio (which may indicate high dependence of mortality leves on nutritional status). This relationship is not so straightforward in Santa Fe probably due to the incidence of epidemics to a good extend independent of nutritional status

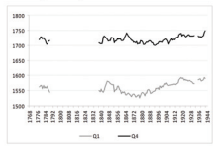
Social inequalities mirrored by the height gap

Height and SES



Height distribution (cohorts, quartiles, 3yr moving averages)





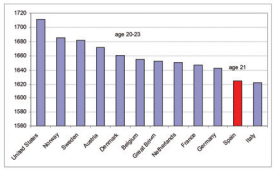
Montefrio

Family	Birth cohort (valid observation)				
	1830-59	1860-89	1890-1909	1910-29	1930-44
García-Valdecasas	1714 (7)	1699 (16)	1689 (6)		1691 (3)
Ruiz-Fuensalida	1757 (2)	1685 (4)	1649 (2)		
Alba	1694 (7)	1691 (7)	1666 (7)	1701 (3)	1708 (3)
Rico	1696 (11)	1691 (7)	1657 (10)	1642 (8)	1676 (9)
Upper class families average	1715 (27)	1693 (34)	1665 (27)	1671 (11)	1692 (12)
Community average	1648	1632	1636	1654	1658

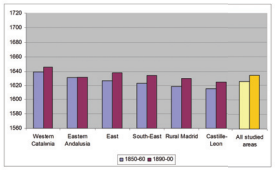
Drop cycles in community height affected both best-off and worst-off. However, differences between social groups usually increased during the downward trends. Also, those on the top always showed *modern* statures (usually between 1.70-1.75 m.) whereas the lower classes were mainly responsible for the poor mean results of the indicator

The Spanish *catch up* during the 20th century

Cohort male height references by the middle of the 19th in some Western countries century

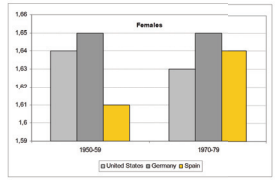


Evidence of the weakness of physical growth in different Spanish regions during the second half of the 19th century (male cohorts, age-standardized at 21)



Sources: Western countries data collected by Crafts from different former works (1997): "Some dimensions of the Quality of life...". *Econ Hist Rev*, 50 (4), pp. 617-639. Spanish data come from the above mentioned ongoing research projects

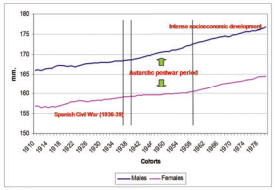
Spanish cohort height compared to the US and Germany's during the second half of the 20th century



Sources: Self-reported heights from national health and nutrition surveys. US and Germany data comes from J. Komlos and M. Baur (2004): "From the tallest to (one of) the fattest...", *Econ Hum Biol*, 2, pp. 57-74.

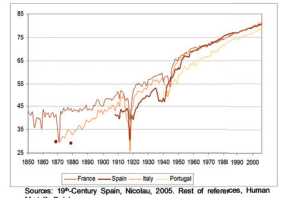
Male and female cohort height displays a notable process of convergence with other Western countries during the second half of the 20th century matching rapid and intense socioeconomic development. Spaniards have reduced half of the difference with Germans and Americans in just one generation. Life expectancy has paralleled this trend. Interestingly, some gender differences can be observed during the first stage of Franco's dictatorship which would deserve further research

Self-reported cohort height in Spain during the 20th century



Sources: Spanish National Health Survey (waves 1987-2003)

Life expectancy at birth in four Western European countries (1850-2006)



Sources: 19th-Century Spain, Nicolau, 2005. Rest of references, Human Mortality Database

Concluding remarks

- Neither economic nor agrarian productive growth seem to have rendered substantial benefits in biological living standards during the second half of the 19th century. Furthermore, some worsening signs can be perceived with respect to the Ancient Regime. In turn, economic progress did render general improvements in well-being, particularly during the second half of the 20th century once proper caloric and protein intake were definitely attained

- Environmental factors lie behind different mortality patterns at the local level and indirectly might have affected net nutritional status. Demographic growth is likely to have intensified structural scarcity during the second half of the 19th century since all social groups' nutritional status worsened. However, lower classes displayed chronic nutritional deficits and the gap widened during the central decades of the 19th century merging with the consolidation of the agrarian capitalism in Spain

POPULATION, HEALTH AND NUTRITION IN SPAIN (18th-20th CENTURIES)[1]

Antonio D. CÁMARA
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Background

Recent reviews by Spanish economic history claim that modern economic growth in that country can be traced back at least to the middle of the 19th century and it would have gained momentum during the last third of that century. Yet some bio-sanitary indicators did not show any significant impovement during the first stages of this economic growth process. For instance, life expectancy remained under 30 years until the 20th century and male cohorts born during the central decades of the 19th century recorded low average heights withouth any consistent trend of improvement until the last decades of that century.

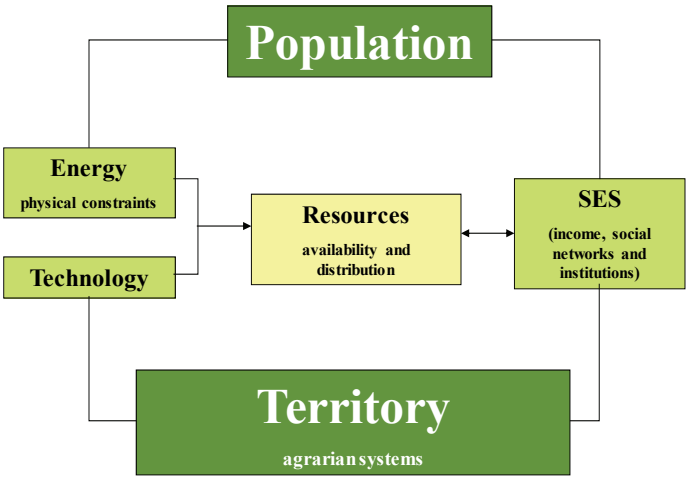
Aims

The objective of this work is the exploration of the potential associations between demographic and socioeconomic variables that potentially affected some health and nutritional outcomes in Spain over the last two centuries. It is also aimed at disentangling the effects of physical, medical and nutritional factors that shapedthe health transition in the country. Both, local level and national level data on height and mortality are analyzed for these purposes.

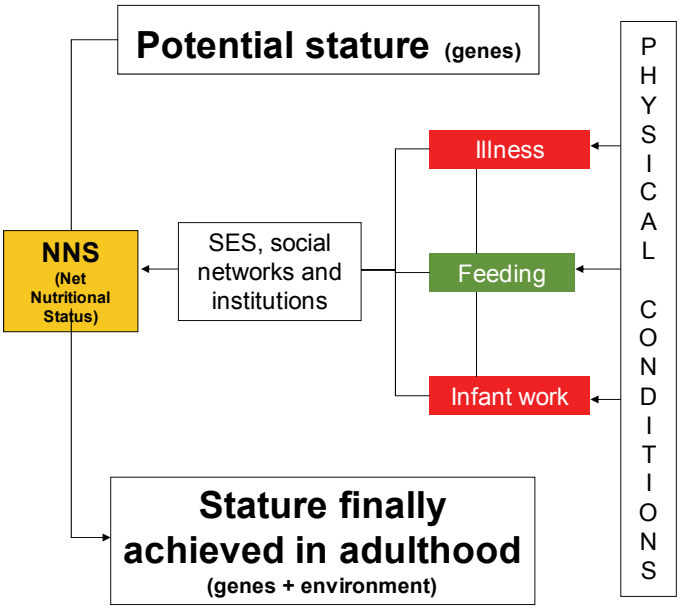
[1] Funding research projects: Ministerio de Educación y Ciencia*, El futuro de la actividad, la salud y la dependencia en España. Una aproximación generacional desde la Demografía* (SEJ2006-002686/GEOG); *Crecimiento, nutrición y bienestar en España. La influencia de los procesos socioeconómicos a largo plazo en los niveles de vida biológicos y la salud* (SEJ2007-67613).

Approaching to basic needs and nutritional status in the past

Meeting basic needs within an agrarian society



Height as a proxy of nutritional status



Study cases: two communities in Southern Spain

The *vega* of Granada: Santa Fe

The *vega* (valley) of Granada displayed early signs of transition to the agrarian capitalism since the last third of the 18th century: productive specialization, increasing commercialization and a high share of private landholding. Irrigation was developed since Muslim's times.

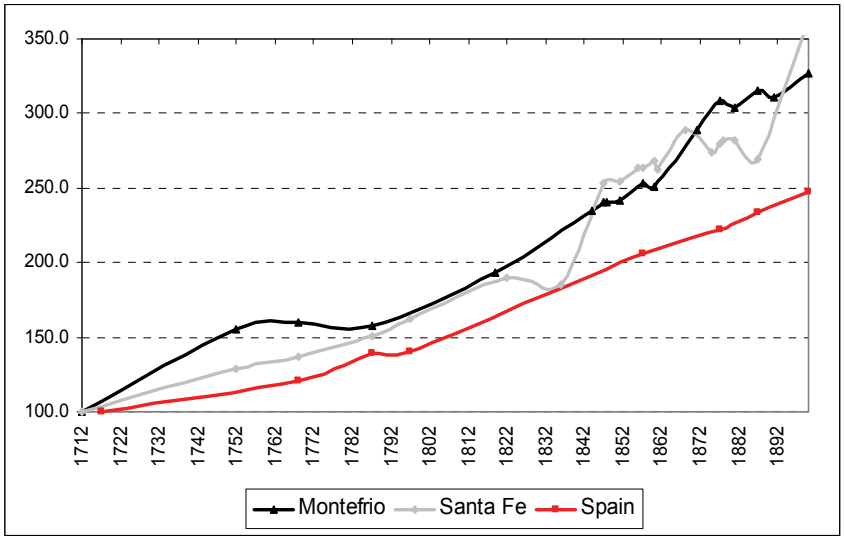
The Eastern Mountains of Granada: Montefrio

The county of the Eastern Mountains preserved a mixed agricultural system until the end of the 19th century when olive orchards progressed rapidly. Commons and livestock breeding were much more relevant than in the valley. Dry farming prevailed in this area.

Demographic background 1712-1900

A sustained demographic growth took place since the 18th century. In 1712 population in Montefrio and Santa Fe was of 4,000 and 2,000 respectively. Both communities doubled these figures by the mid 19th century. Spain raised from 7,5 millions at the beginning of the 18th century to 10,5 in 1787 and 15,5 in 1857.

Mortality crises were usual until the 20th century.



Summary on data and methodology

- These communities were selected as representative of different agro-ecological contexts as well as different trajectories and pacesof transition towards the agrarian capitalism during the 19th century.
- Sources: local censuses, military recruitment books and parish registers.
- Data collection at a micro level spaned from cohorts born 1750-1950.-These data included the following information: name, surname, household, height and date and cause of death. (N amounted to about 20,000 cases).
- *Main indicators*
- Age-standardized height as a proxy of net nutritional status: time-cohort series when specific heights are available / estimates when the register is not exhaustive.
- Mortality (rates and patterns) as proxies of the disease exposure.

Early evidence on nutritional status in the 18th century

Indirect long-term approaches report on a likely drop of mean height during the first stage of agrarian capitalism with respect to the last stage of Ancient Regime.

Evolution of the minimum height required at enlistment in Spain (regular troops)

	Unit of measure cited in the sources	Conversion (mm.)
1741	*Five feet* (**French foot**)	1625
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1819	*Five feet minus half of an inch*	1609
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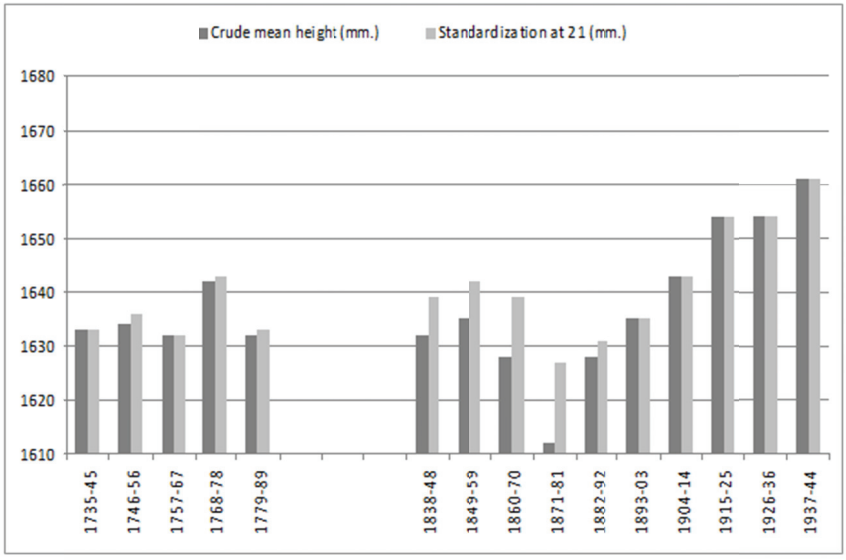
1836	*Four feet, ten inches and six lines*	1582
1837	*Five feet minus one inch*	1597
1856	*Five feet* (**Spanish foot**)	1596
1859	1569 mm.	1569
1860	1560 mm.	1560
1875 (2nd recuitment)	1530 mm.	1530
1877	1540 mm.	1540
1882	1545 mm.	1545
1912	1540 mm.	1540

Male height cycles in Montefrio since the Ancient Regime (cohorts and mm.)



Long-term trends in cohort height (logistic regression informs on the likelihood to reach a minimum height of 1625 mm.)

	B	S.E.	Wald	df	Sig.	Exp(B)
cohort			161,111	3	,000	
Prior to 1800	Ref					
1800-49	-,125	,082	2,350	1	,125	,882
1850-1899	-,235	,067	12,485	1	,000	,790
After 1900	,292	,065	19,993	1	,000	1,339
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Montefrio	Ref					
Santa Fe	,008	,037	,045	1	,832	1,008
Constant	,098	,071	1,896	1	,168	1,103

a Variable(s) entered on step 1: cohort, age, community

Sources: Military recruitment Books from Santa Fe and Montefrio (around 20,000 valid cases aged 19+. 1,500 valid cases within the reference category: cohorts born prior to 1800).

Biological standards of living during the 19th century: environmental determinants

Some physical conditions like climate, altitude and isolation likely determined the mortality patterns of Santa Fe and Montefrio. Thus it this also expected that indirectly, these patterns (as indicators of the exposure to illness) influenced the net nutritional status as well. The different prevalence of high energy consuming diseases like malaria illustrates this. Malaria was endemic in the swampy lands of the Vega and probably its effects were fueled by the development of massive irrigation during the 19th century. A higher population density and the fact to be a crossroad also eased the spread of epidemics in this area. Altogether, mortality and height display divergent trends in Montefrio (which may indicate high dependence of mortality levels on nutritional status). This relationship is not so straightforward in Santa Fe probably due to the incidence of epidemics which to a good extent may be considered independent of the nutritional status of the population.

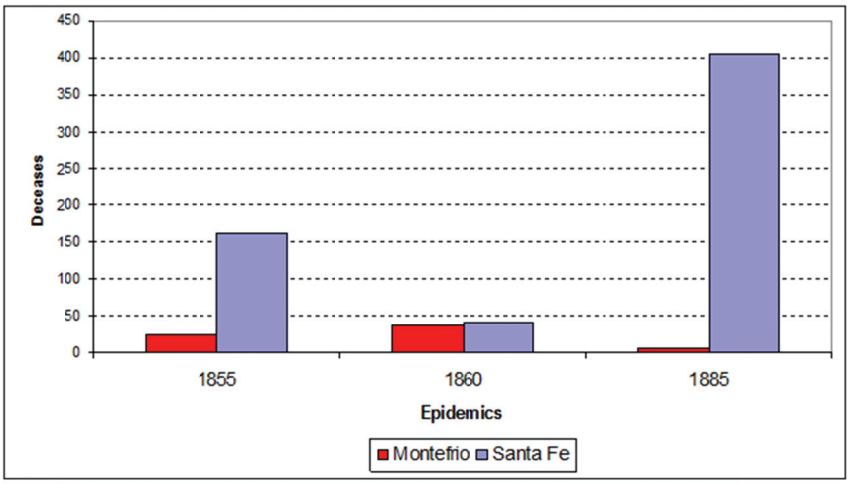
Approximation to the epidemilogical context through the mortality patterns by cause

1841-1880

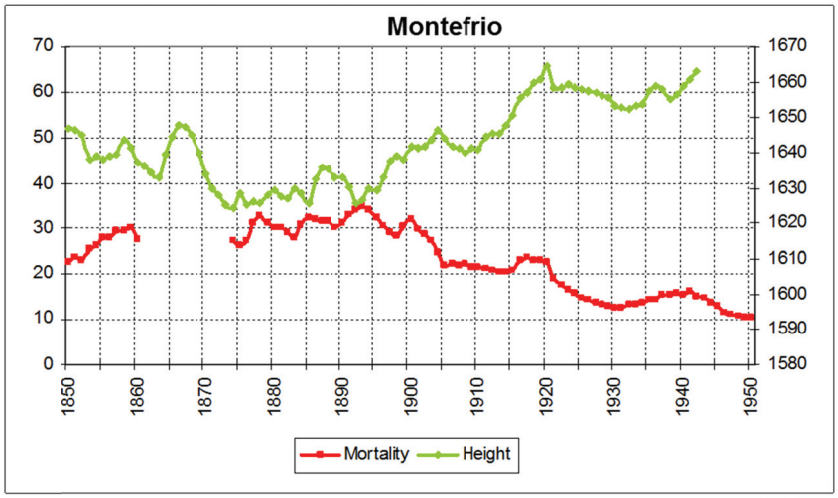
Montefrío			Santa Fe		
Cause	Deaths	%	**Cause**	Deaths	%
Diarrhea and enteritis	1031	16,69	No specified fevers and infections	1152	23,18
No specified fevers and infections	757	12,25	**Infectious transmitted by vectors (malaria)**	636	12,80
Respiratory system	720	11,65	*Dentición* (Teething)	560	11,27
Respiratory system (infectious)	537	8,69	Circulatory system	317	6,38
Infectious transmitted by vectors	361	5,84	Respiratory system (infectious)	265	5,33
Circulatory system	310	5,02	Respiratory system	258	5,19
Infectious associated to infancy	294	4,76	**Infectious transmitted by water and foods**	248	4,99
Smallpox	279	4,52	Cerebral hemorrhage	228	4,59
Dentición (Teething)	233	3,77	Measles	218	4,39
Birth or pregnancy	177	2,87	Infectious associated to infancy	175	3,52
Total	4699	**76,06**		4057	**81,65**

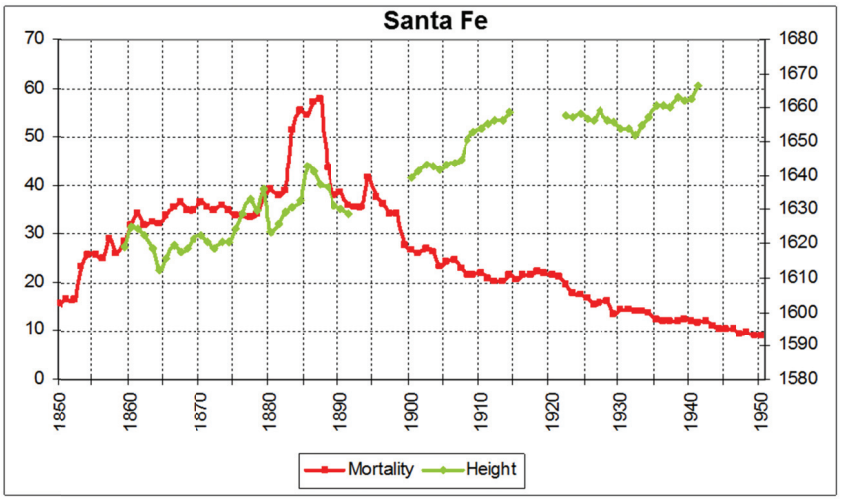
Source: Own calculations from the adapted McKeown's classification in Bernabeu et al. (2003): "El análisis histórico de la mortalidad por causas: problemas y soluciones". Revista de Demografía Histórica, XXI, I, pp. 167-193.

Cholera outbreaks over the 19th century



Crude mortality rate and male cohort height (per thousand and millimeters; 5yr moving average)

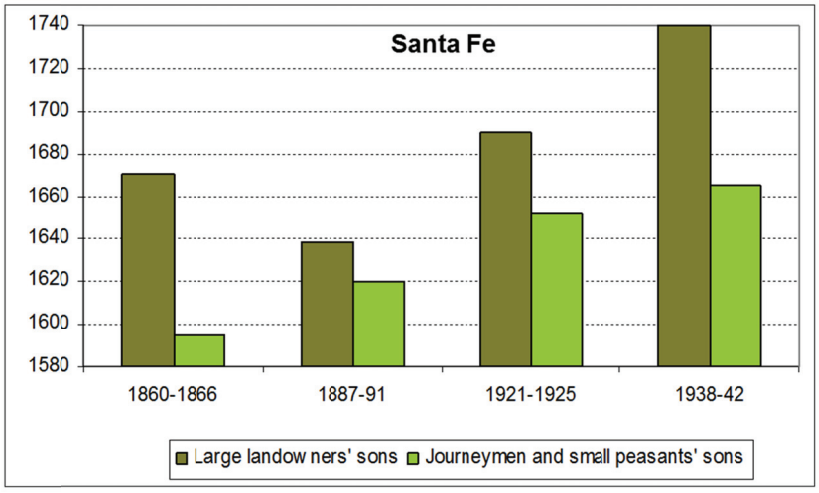




Social inequalities mirrored by the height gap

While height drop cyclesaffected both the best-off and the worst-off, height differentials between social groups usually increased during the downward cycles. Also, the wealthy always were close to *modern* statures (usually between 1.70-1.75 m.) whereas the lower classes were mainly responsible for the poor mean results of the indicator.

Height and SES

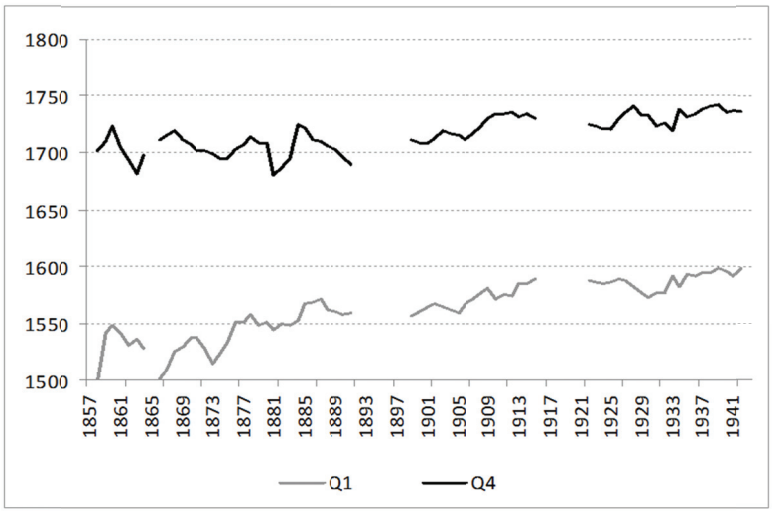


Montefrio

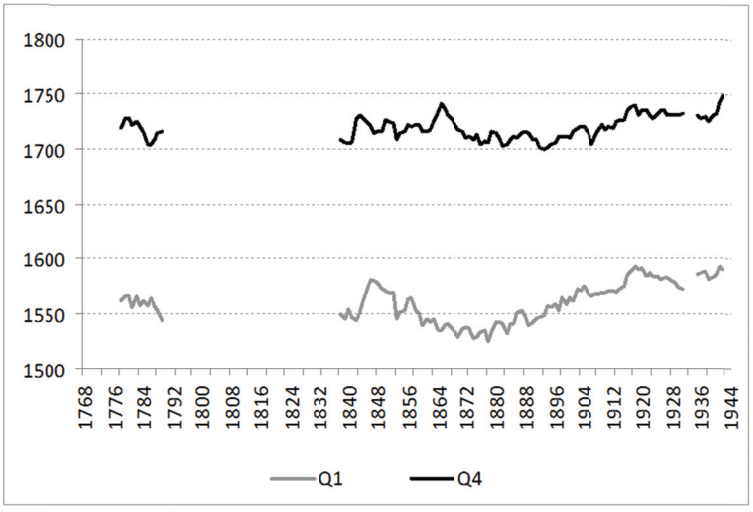
Family	Birth cohort (valid observations)				
	1830-59	**1860-89**	**1890-1909**	**1910-29**	**1930-44**
García-Valdecasas	1714 (7)	1699 (16)	1689 (8)		1691 (3)
Ruiz-Fuensalida	1757 (2)	1685 (4)	1649 (2)		
Alba	1694 (7)	1691 (7)	1666 (7)	1701 (3)	1708 (3)
Rico	1696 (11)	1691 (7)	1657 (10)	1642 (8)	1676 (9)
Upper class families average	1715 (27)	1691 (34)	1665 (27)	1671 (11)	1692 (12)
Community average	1648	1632	1636	1654	1658

Height distribution (cohorts, quartiles, 3yr moving averages)

Santa Fe (1857-1943)

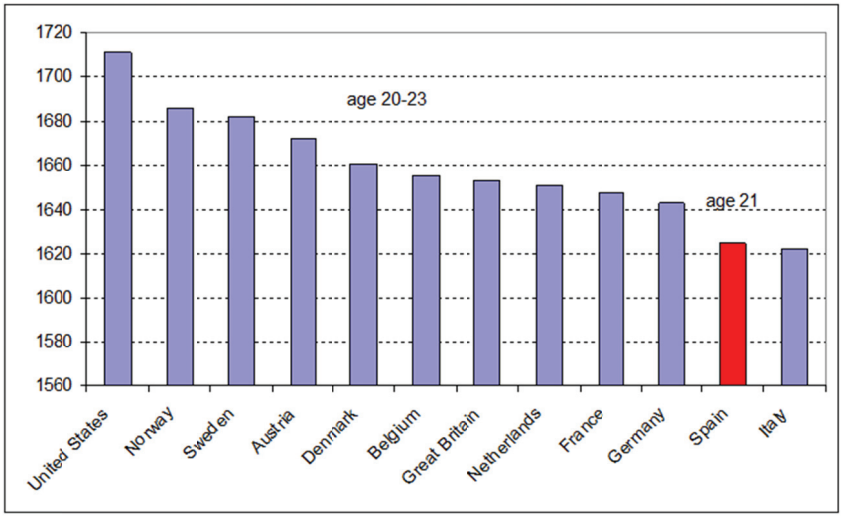


Montefrio (1776-1944)



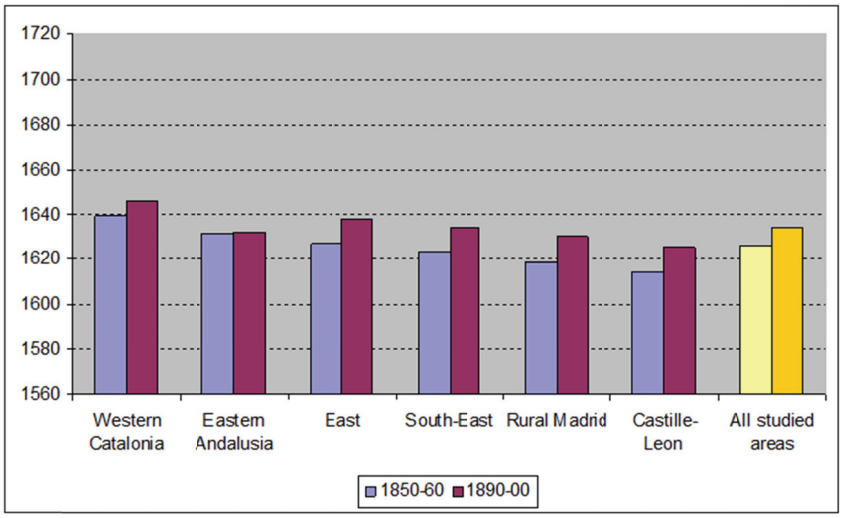
The Spanish *catch up* during the 20th century

Cohort male height by the middle of the 19th century in some Western countries century (mm)



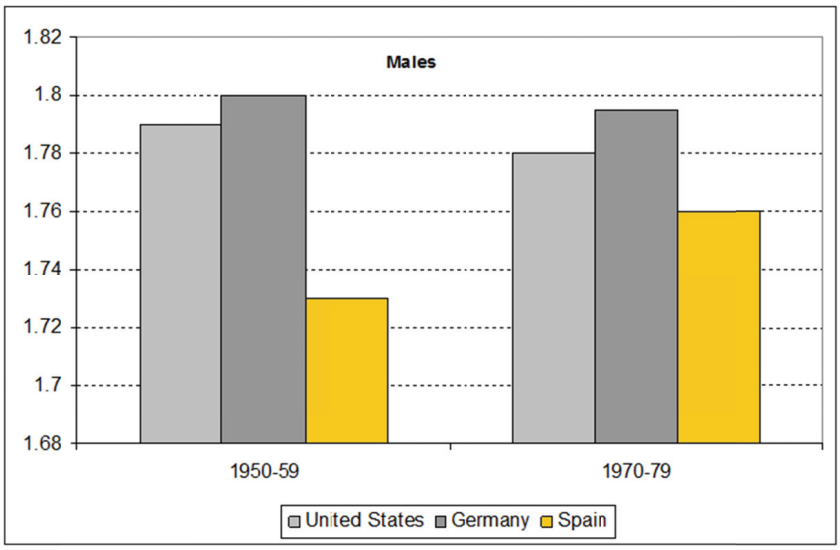
Sources: Western countries data were collected by Crafts (1997) from former works: "Some dimensions of the Quality of life…". *Econ Hist Rev*, 50 (4), pp. 617-639. Spanish data come from the above mentioned ongoing research projects.

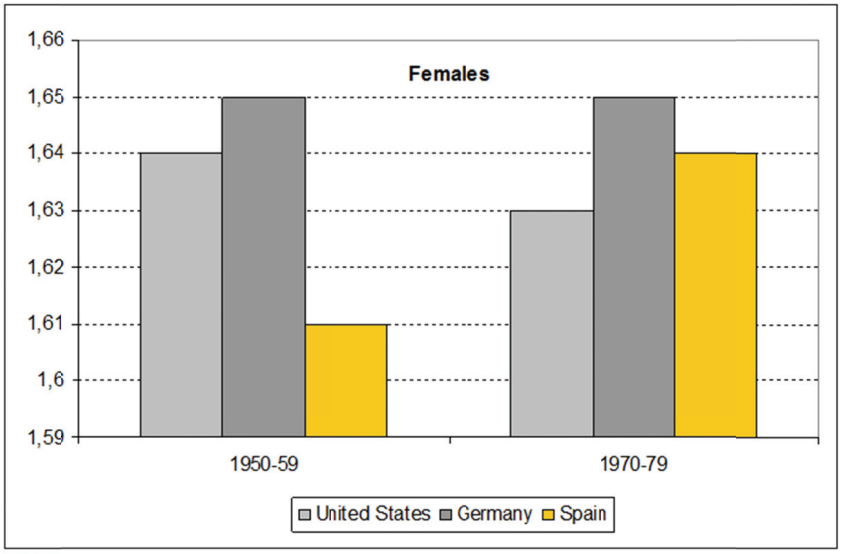
Evidence of inter-cohort stunting in different Spanish regions during the second half of the 19th century (male cohorts; height is age-standardized at 21)



Sources: Western countries in Crafts(1997): "Some dimensions of the Quality of life…". *Econ Hist Rev*, 50 (4), pp. 617-639. Spanish data come from the above mentioned ongoing research projects.

Cohort height in Spain the US and Germany's during the second half of the 20th century



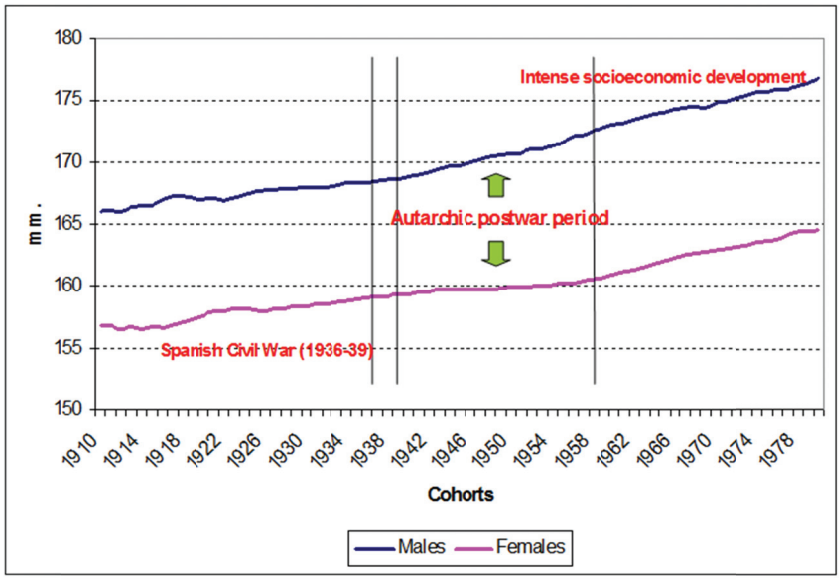


Sources: Self-reported heights from national health and nutrition surveys. US and Germany data comes from J. Komlos and M. Baur (2004): "From the tallest to (one of) the fattest…", *Econ Hum Biol*, 2, pp. 57-74.

Male and female cohort height displays a notable process of convergence with other Western countries during the second half of the 20th century matching rapid and intense socioeconomic development. Spaniards reduced half of the difference with Germans and Americans in just one generation. Life expectancy has paralleled this trend. Interestingly,

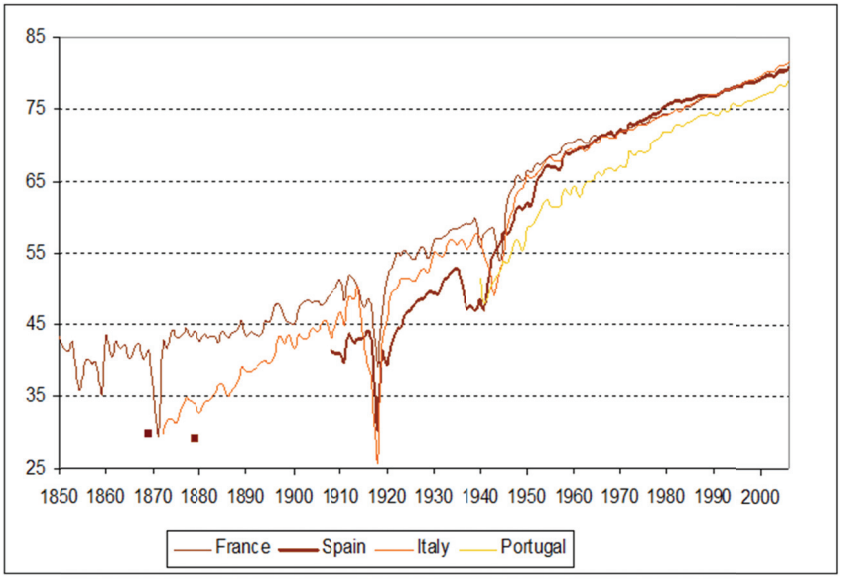
some gender differences can be observed during the first stage of Franco's dictatorship which would deserve further research.

Self-reported cohort height in Spain during the 20th century



Sources: Spanish National Health Survey (waves 1987-2003).

Life expectancy at birth in Southern Europe (1850-2006)



Sources: 19th-Century Spain, Nicolau, 2005. Rest of references, Human Mortality Database.

Concluding remarks

- Neither economic growth nor agrarian modernization rendered substantial benefits in biological living standards during the second half of the 19th century in rural Spain. Actuallywe have provided some preliminary evidence about the worsening of the net nutritional status during the central decades of the 19th century with respect to the Ancient Regime. By contrast, economic growth did render general improvements in well-beingduring the second half of the 20th century
- Some physical factors lie behind different mortality patterns at the local level which indirectly might have affected the net nutritional status of the population. Demographic growth is likely to have aggravated the structural scarcity during the second half of the 19th century but this does not seem the only factor that affected negatively the health outcomes. Illustratively all social groups worsened their net nutritional status. This said the lower classes displayed chronic nutritional deficits and the height gap with respect to the wealthy broadened during the central decades of the 19th century merging with the consolidation of the agrarian capitalism in Spain.